

hypothetical plane, and a single water/oxygen flow path and a single hydrogen flow path are shared by the plurality of water electrolytic cells.

18. (New) A water electrolytic apparatus according to claim 16, wherein said solar cell is of a panel shape and superposed on said plurality of water electrolytic cells.

19. (New) A water electrolytic apparatus according to claim 15, wherein each of said water electrolytic cells is laminated.

20. (New) A water electrolytic apparatus according to claim 15, wherein each cathode is plate shaped and each anode is plate shaped.--

REMARKS

Claims 1-20 are pending. By this Amendment, claims 9-20 are added. As claims 9-20 correspond to the subject matter recited by claims 1-8, Applicants respectfully submit that no new matter is presented therein.

Claims 1-8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,667,647 to Suga et al. (hereinafter "Suga") in view of U.S. Patent No. 4,311,569 to Dempsey et al. (hereinafter "Dempsey"). Applicants respectfully traverse the rejection.

Pending claim 1 recites a water electrolytic apparatus including a plurality of water electrolytic cells each having a solid polymer electrolyte membrane, an anode, and a cathode. The anode and the cathode are plate shaped and arranged on opposite sides of the electrolyte membrane, respectively. The water electrolytic cells are developed on a hypothetical plane and are electrically connected in series to one another, wherein each of the water electrolytic cell, electrolyte membrane, anode, and

cathode are developed on respective hypothetical planes that extend parallel to one another and the anode and cathode have a uniform thickness throughout.

As noted above, pending claim 1 recites each anode and cathode are plate shaped. Furthermore, pending claim 1 recites the polymer electrolytic membrane is solid. Therefore, as explained in the Response dated April 30, 2002 and again explained in the Response dated September 3, 2002, due to the recited structure of the solid polymer electrolyte membrane, the plate shaped anode, and the plate shaped cathode in each water electrolytic cell being developed on respective hypothetical planes that extend parallel to one another, the thickness or height of the water electrolytic cell in a direction that is perpendicular to the hypothetical planes can be made relatively small, thereby making the thickness of the entire water electrolytic apparatus relatively small.

The Office Action states Suga discloses an electrolytic apparatus including a plurality of electrolytic cells, each having an ion exchange film 3, an anode (positive pole) 1, and a cathode (negative pole) 1. The anode 1 and cathode 1 are arranged on opposite sides of the ion exchange film 3, respectively. However, the Office Action admits that Suga does not disclose a solid polymer electrolyte membrane or plate shaped anodes and cathodes of uniform thickness.

The Office Action notes Dempsey teaches a solid polymer electrolyte membrane 1, a plate shaped anode 11, and a plate shaped cathode 12, wherein the anode and cathode have uniform thickness.

The Office Action takes the position that it would have been obvious to one of ordinary skill in the art to have substituted the ion exchange membrane 3, the anode (positive pole) 1, and cathode (negative pole) 1 taught by Suga with the solid polymer electrolyte membrane 1, anode 11, and cathode 12 taught by Dempsey. The Office Action bases the stated position on the premise that both Suga and Dempsey are concerned with electrolytic cells for gas generation and that Dempsey teaches a solid polymer electrolyte membrane and plate shaped anode cathode of uniform thickness would provide improved performance, improved stability, and reduced cost by using a catalyst to concentrate or produce gases by electrolysis.

Applicants note, as stated in the Response dated September 3, 2002, the anode and cathode disclosed by Suga are box shaped wall structures 1, 1 that are not plate shaped such that they have a uniform thickness. In particular, each box shaped wall structure 1 disclosed by Suga includes an interior surface area 2 having a framework 4 that is coated with metal. The framework 4 projects from an interior surface of the box shaped wall structures 1 and is formed of a plurality of intersecting horizontal and vertical members that divide the interior space of the box shaped wall structures into a series of rectangular spaces. Notches 5 are formed in the horizontal and vertical members and are formed in a central portion of an edge of each interior wall forming the rectangular spaces which are formed by the horizontal and vertical members. See column 2, line 57 to column 3, line 1 and Figures 1(A) and 2 of Suga. Furthermore, the framework disposed in the interior of each box-shaped wall structure forms an irregular

surface, coated with a metal film, *to provide an increased surface area for each electrode*. See column 1, lines 45-47.

In other words, not only are the “irregular surfaces” of Suga not plate shaped, as are the anode and cathodes recited by pending claim 1, but Suga clearly and unambiguously states the “irregular surfaces” were chosen to increase the surface area of each electrode. In fact, Suga further explains the “irregular surfaces” of the anode and cathode, which are coated with metal to form an electrode and lower the electrical resistance thereof, of the electrodes increases the surface area of each gas chamber, were chosen to lower the voltage between the anode (positive) and cathode (negative) electrodes 1, 1, thereby improving the electrolytic efficiency of the electrolysis operation. See column 5, lines 21-28 of Suga.

Put simply, Suga does not disclose plate shaped anodes and cathodes having uniform thickness, but rather specifically discloses box shaped wall structures that have a varying thickness and are formed by the structural arrangement of the horizontal and vertical members comprising the interior framework and the notches provided therein wherein the interior of each box-shaped wall structure has an irregular surface.

The Office Action, disregarding the specific teaching of Suga, which clearly explains that the anode and cathode were constructed with irregular surfaces for “improving . . . electrolytic efficiency,” takes the position that it would have been obvious for one of ordinary skill in the art to substitute the irregular surface of the anode and the irregular surface of the cathode taught by Suga with the plate shaped anode

and plate shaped cathode taught by Dempsey as such a modified Suga would be provided with "improved performance, improved stability, and reduced cost."

Applicants respectfully submit that the modification to Suga proposed by the Office Action is contrary to the specific teachings of Suga, which clearly explains the purpose for providing an anode with an irregular surface and a cathode with an irregular surface is to improve electrolytic efficiency. Applicants also respectfully submit that the proposed modification put forth by the Office Action does not satisfy the requirements for establishing *prima facie* obviousness identified in the M.P.E.P.

In particular, Applicants respectfully note that §2143 of the M.P.E.P. explains that to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the applied art of record must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. See *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991).

The test for obviousness is what the combined teachings of the references would have suggested to one of ordinary skill in the art, and *all teachings* in the applied art of record must be considered to the extent that they are in analogous arts. Where the teachings of two or more prior art references conflict, the Examiner must weigh the power of each reference to suggest solutions to one of ordinary skill in the art,

considering the degree to which one reference might accurately discredit another. See *In re Young*, 927 F.2d 588 (Fed. Cir. 1991).

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. See *In re Mills*, 916 F.2d 680 (Fed. Cir. 1990).

If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. See *In re Ratti*, 270 F.2d 810 (CCPA 1959). In reversing a rejection of claims based on a combination of references, the courts held that the "suggested combination of references would require a substantial reconstruction and redesign of the elements shown in [the primary reference] as well as a change in the basic principle under which the [primary reference] construction was designed to operate." *Id* at 813.

Based on the rule of law held in *In re Ratti*. Applicants respectfully submit that reconstructing the Suga electrolytic apparatus by removing the irregular shaped anode and irregular shaped cathode and substituting such with the plate shaped anode and cathode taught by Dempsey would *decrease* the surface area of the anode and cathode, as well as decrease the electrolytic efficiency of the electrolysis operation of such a modified Suga apparatus. Applicants respectfully submit while the Suga apparatus could be modified to include the plate shaped anode and cathode taught by Dempsey, Applicants respectfully submit that one of ordinary skill in the art would not be motivated to do so as the modified Suga apparatus would perform worse or less

efficiently compared to the apparatus disclosed by Suga. Put simply, the modification to Suga proposed by the Office Action as the basis in rejecting claims 1-8 of the application would require a substantial reconstruction and redesign of the elements shown in Suga as well as a change in the basic principle under which Suga structure was designed to operate, all of which would result in performance that is worse than the apparatus disclosed by Suga and which is not permissible under current case law as such a basis is impermissible in establishing *prima facie* obviousness.

Accordingly, Applicants respectfully submit the Office Action has not established a *prima facie* case of obviousness. For the above provided reasons, Applicants respectfully submit that pending claim 1 is not rendered obvious under 35 U.S.C. § 103 by Suga and Dempsey. Therefore, claim 1 should be deemed allowable.

Claims 2-8 depend from claim 1. If an independent claim is nonobviousness under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious. See *In re Fine*, 837 F.2d 1071 (Fed. Cir. 1988). Therefore, it is respectfully submitted that these seven (7) dependent claims should be deemed allowable for the same reasons claim 1 is allowable, as well as for the additional subject matter recited therein.

Withdrawal of the rejections is respectfully requested.

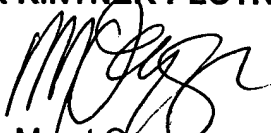
With regards to new claims 9-20, Applicants respectfully submit the claims correspond to claims 1-8 and should also be deemed allowable for at least the same reasons claims 1-8 are allowable, as well as for the additional subject matter recited therein.

In view of the foregoing, reconsideration of the application, withdrawal of the outstanding rejection, allowance of claims 1-20, and the prompt issuance of a Notice of Allowability are respectfully solicited.

Should the Examiner believe anything further is desirable in order to place this application in better condition for allowance, the Examiner is requested to contact the undersigned at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, **referencing attorney docket number 107348-00096.**

Respectfully submitted,
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